## REMARKS

Claims 4-9, 13-17, 23-28, 45, 46, 49, and 50 are pending. Claims 23-28 have been cancelled. No claims are allowed.

Claims 4, 13, and 45 were amended to relate to vaccines and methods for protecting an equid against disease caused by *Sarcocystis neurona* using a vaccine or composition consisting of the 16 and 30 kDa antigens. As stated on page 13, lines 2-5, a preferred embodiment of the present invention is a subunit vaccine that contains the 16 and 30 kDa antigens. The specification also states that the "vaccines are also intended for the therapeutic treatment of equids already infected with *Sarcocystis neurona*" (page 15, lines 11-13). Protecting an equid against disease caused by *Sarcocystis neurona* is a therapeutic use.

While Claim 13 referred to recombinant antigen and Claim 4 had been amended in the response to Paper No. 3 to call for a recombinant polypeptide, as shown above, the applicants' invention is not limited only to vaccines consisting of recombinant antigens. The present amendments to Claims 4, 13, and 45 have been made to place the claims in a form that is fully supported by the specification by eliminating the reference to "recombinant."

The applicant's vaccines as set forth in the

present claims as amended are not anticipated by Liang because Liang does not disclose a vaccine consisting of both the 16 and 30 kDa antigens. The claims are not *prima facie* obvious in view of Liang because while Liang teaches that a 16 kDa antigen is neutralizing and may have protective ability (page 1837, col. 1), Liang further teaches that the 30 kDa antigen is non-specific (page 1837, col. 1) and has no inhibitory activity (page 1836, col. 1). In light of Liang, one skilled in the art would not have been motivated to make a vaccine that contained both the 16 and 30 kDa antigens.

Claim 23-28 have been cancelled without prejudice. The remaining claims are generic and are believed to include vaccines and methods for using the vaccines comprising the fusion proteins of Claims 23-28.

1. Claims 4-9, 13-17, 23-28, 45-46, and 49-50 were rejected under 35 U.S.C. § 112, first paragraph. In particular, the rejection stated that while the claims are drawn to vaccines comprising epitopes of the 16 and 30 kDa antigens, the sequences comprising the epitopes have not been identified or described.

Claims 23-28 have been cancelled. Claims 1, 13, and 45 have been amended to call for a vaccine or composition that consists of the 16 and 30 kDa antigens. The applicants teach in Examples 3 and 4 methods for

isolating *Sarcocystis neurona* and on page 33, lines 25-34, the applicants teach the isolation of the 16 and 30 kDa antigens by 2-D gel electrophoresis. Further identification of the antigens can be found in U.S. 6,153,394 to Mansfield *et al.*, which was incorporated by reference (page 13, lines 16-19)[1]. One with ordinary skill in the art would be able to make the vaccine of the present invention by following the teachings in the specification. There would be no undue trial and error involved in producing the vaccine as claimed.

In light of the amendments to Claims 4, 13, and 45, it is believed that the claimed vaccines or compositions are adequately taught in the specification. Reconsideration of the rejection is requested.

2. Claims 4-9, 13-17, 45-46, and 49-50 were rejected under 35 U.S.C. § 112, first paragraph. In particular, the rejection stated that the specification does not provide a nexus between the 16 and 30 kDa antigens and a functional prophylactic vaccine comprising the same.

The amendments to Claims 4, 13, and 45 limit the claims to therapeutic vaccines and methods for preventing disease caused by *Sarcocystis neurona*. The

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[1] U.S. 6,153,395 was Application Ser. No. 09/156,954, filed September 18, 1998. The previous amendment replaced the reference to the application with its patent number.

applicants' vaccine is drawn to preventing disease caused by the parasite, not infection by the parasite.

Liang states that protective antibodies to some apicomplexan parasites are effective *in vitro* for reducing production but not *in vivo* possibly because of the prolonged time that the parasite needs to be exposed to specific antibodies *in vivo* to yield a significant reduction in parasite production (page 1837, last full para.). Liang states that in the horse, because the merozoite moves more directly from cell to cell (which limits the exposure of the merozoite to serum), the exposure time for newly released parasites may be of insufficient duration for the horse's antibodies to be effective (page 1837, last full para.). However, the applicants' vaccine is not directed towards reducing parasite production *in vivo*, instead it is directed towards preventing the parasite from entering the central nervous system of the horse. As Liang also states, "[I]n the case of EPM, disease only occurs only after the merozoite passes through the vascular endothelium of the blood-brain barrier into the central nervous system, and so humoral responses may play an essential role in blocking this migration" (page 1837, last full para.). Therefore, in light of the general statements made by Liang, the applicants' vaccine would be effective in preventing disease caused by the

parasite, even if the vaccine did not prevent production of the parasite.

As amended, Claims 4, 13, and 45 are limited to prevention of disease caused by the parasite and not infection by the parasite. Therefore, it is believed that the applicants' vaccine is enabled by the specification. Reconsideration of the rejection is requested.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attachment is captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE**."

In view of the above, it is believed that Claims 4-9, 13-17, 45-46, and 49-50 are in proper form for allowance. Notice of allowance is requested.

Respectfully,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claims 23 to 28 have been cancelled.

Claims 4, 13, and 45 have been amended as follows.

-4-(Thrice amended)

A vaccine for [active immunization of] preventing disease in an equid [against] caused by a *Sarcocystis neurona* infection comprising [a recombinant polypeptide consisting essentially of at least one epitope of] a 16 (±4) kDa *Sarcocystis neurona* antigen and [at least one epitope of] a 30 (±4) kDa *Sarcocystis neurona* antigen.

-13-(Amended)

A method for [vaccinating] preventing disease in an equid [against] caused by a *Sarcocystis neurona* infection comprising:

(a) providing a [recombinant antigen of *Sarcocystis neurona* produced from a microorganism culture wherein the microorganism contains a DNA that encodes at least one epitope] composition consisting essentially of a 16 (±4) kDa antigen [and/or] and a 30

(±4) kDa antigen of *Sarcocystis neurona*; and

(b) vaccinating the equid <u>with the composition to prevent the disease</u>.

-45- (Amended)

A method for [protecting] <u>preventing disease in</u> an equid [against] <u>caused by a</u> *Sarcocystis neurona* <u>infection</u> which comprises providing a [vaccine] <u>composition</u> that when injected into the equid causes the equid to produce antibodies against a 16 (±4) kDa antigen [and/or] <u>and a</u> 30 (±4) kDa antigen of the *Sarcocystis neurona* wherein the antibodies prevent [infection] <u>the disease caused</u> by the *Sarcocystis neurona*.